Sept. 21, 1965 S. V. EHRLICH 3,207,347

BOOM ATTACHMENT FOR LIFT TRUCK

Filed Aug. 26, 1963 2 Sheets-Sheet 1

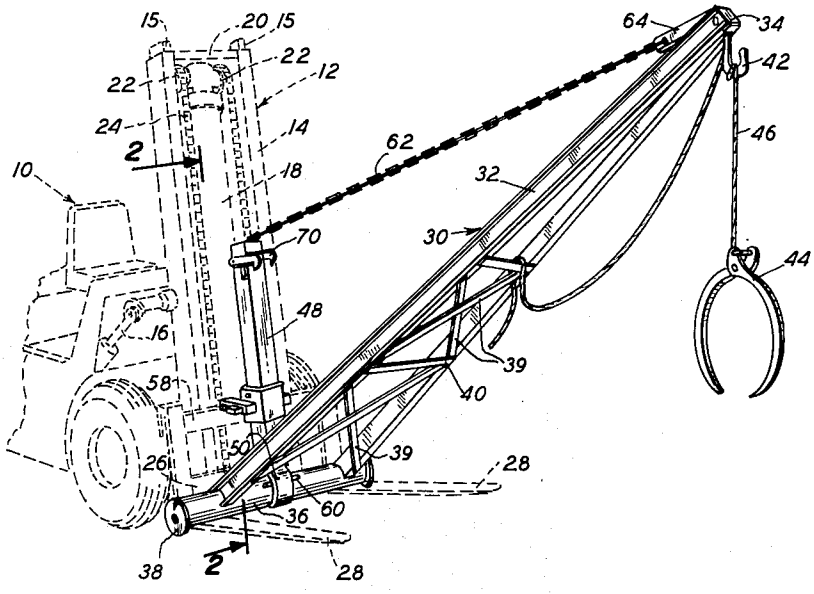

Fig. 1

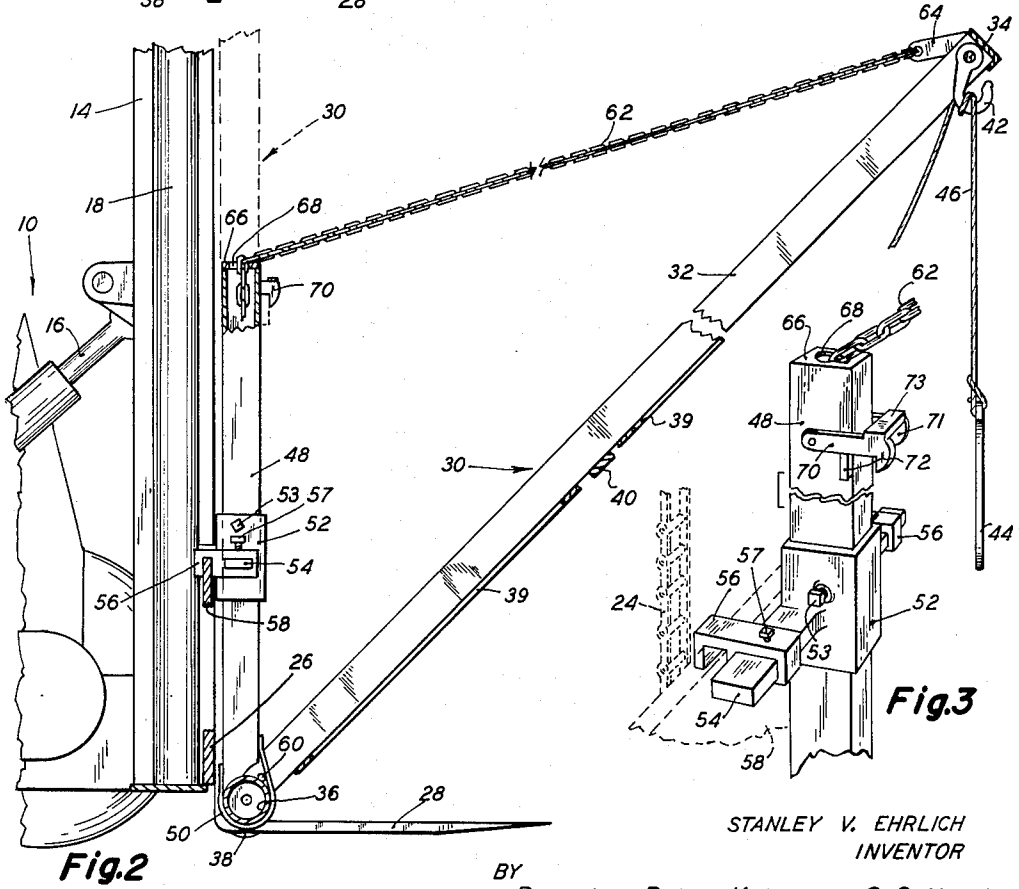

Fig. 2

Fig. 3

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Filed Aug. 26, 1963 2 Sheets-Sheet 2

Fig.4

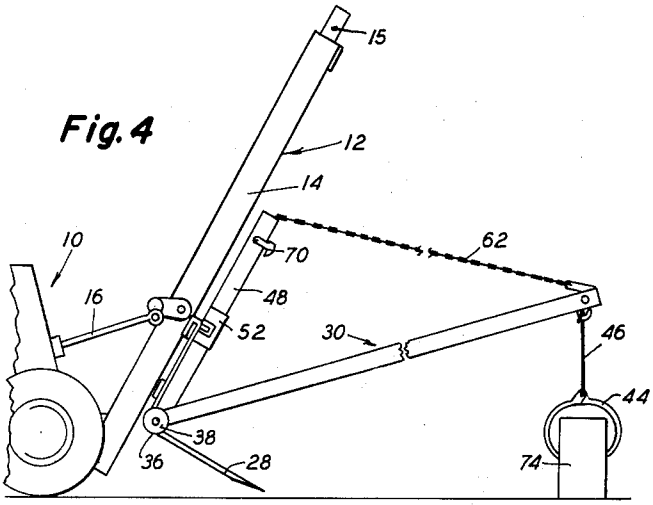
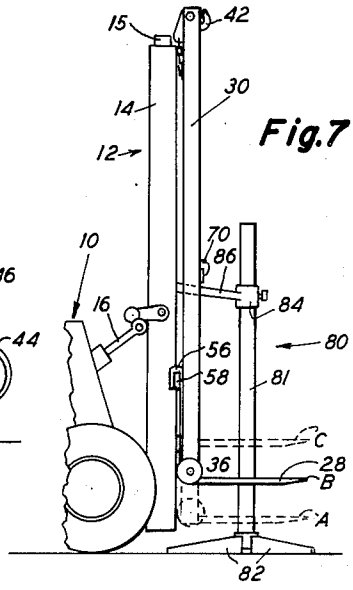


Fig.7



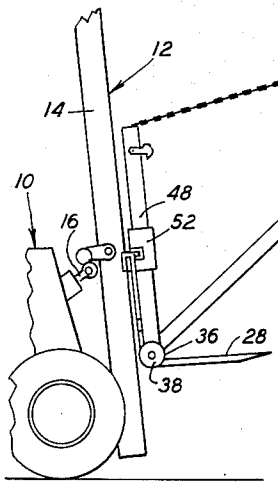


Fig.5

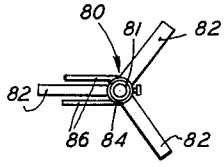


Fig.8

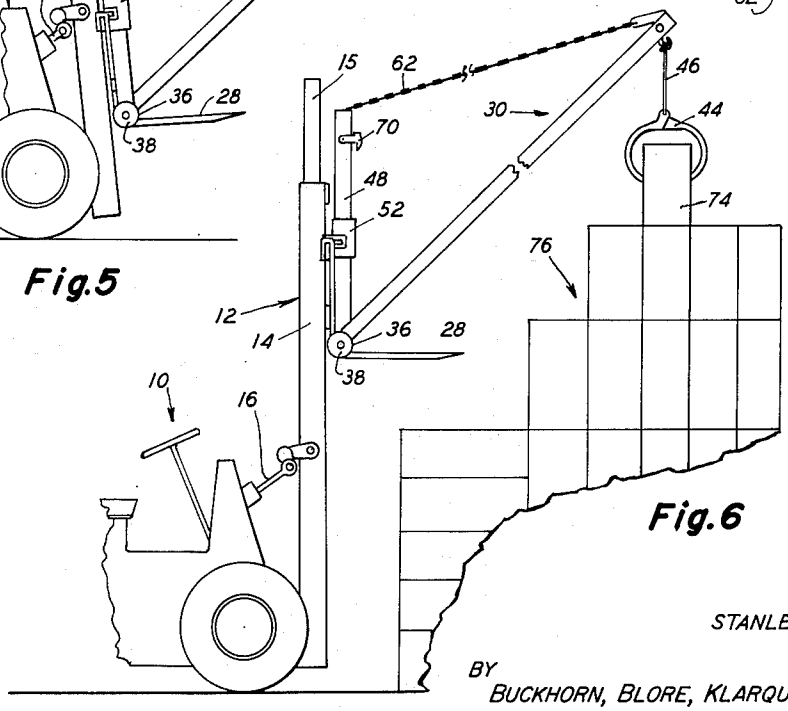


Fig.6

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BOOM ATTACHMENT FOR LIFT TRUCK

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6 Claims. (Cl. 214—620)

The present invention relates to lift truck attachments and more particularly to a boom attachment for a lift truck.

Boom attachments for lift trucks have been found to be very useful for loading and unloading railroad cars and trucks with sideboards. Such booms are especially effective in lifting heavy machinery, engines, structural members, logs and other items which conventional fork arms cannot readily handle.

However, previously devised boom attachments are relatively difficult and time-consuming to mount and detach from a lift truck, and some require removal of the fork arms for mounting. Even those boom attachments mountable on a lift truck with the fork arms intact must usually be removed when it is desired to again use the fork arms.

Accordingly, a primary object of the present invention is to provide a new and improved boom attachment for a lift truck which can be mounted and detached by the lift truck operator alone while he remains at his controls, by a simple manipulation of the fork arms of the truck.

Another primary object of the present invention is to provide a new and improved boom attachment for a lift truck which can be swung to an inoperative position on the truck for use of the fork arms.

Another object of the invention is to provide a new and improved boom attachment for a lift truck which can be manipulated by use of the conventional hydraulic load handling mechanisms of the truck.

In fulfillment of the above objects, the boom structure of the attachment includes a trunnion base member which, when the attachment is mounted on a lift truck, rests in the angle of the fork arms thereof. The boom structure is rotatable on the fork arms relative to an upright post member which is hooked on the lift carriage of the truck to secure the attachment in position. When in use, the boom structure is maintained at an angle relative to the post member, but when it is desired to use the fork arms, the boom structure is simply swung to an upright inoperative position and latched to the post member. The boom structure is manipulated for lifting loads by lifting the carriage and tilting the mast structure in the usual manner.

The foregoing and other objects and advantages of the present invention will be more readily ascertained from inspection of the following specification taken in connection with the accompanying drawing wherein like numerals refer to like parts throughout, while the features of novelty will be more distinctly pointed out in the appended claims.

With reference to the drawings:

FIG. 1 is a perspective view showing a boom attachment in accordance with the present invention in position on a lift truck;

FIG. 2 is an enlarged fragmentary section taken approximately along the line 2—2 of FIG. 1 showing the boom attachment and the front end portion of a lift truck;

FIG. 3 is a perspective view of the means for securing the boom attachment to the front end of a lift truck;

FIGS. 4 to 6 inclusive are diagrammatic views illustrating the use of the boom attachment in lifting objects;

FIG. 7 is a diagrammatic view illustrating the procedure for attaching the boom on a lift truck;

FIG. 8 is a top plan view of a storage stand for storing the boom attachment when not attached to a lift truck.

With reference first to FIG. 1, indicated in dotted lines is the forward portion of a lift truck **10** of a type with which the boom attachment of the invention may be utilized. Such truck includes a mast structure **12** comprising opposed pairs of inner and outer telescoping upright members **14** and **15**. The mast structure **12** is pivotally mounted at its lower end on the front end of the lift truck frame and is tilted forwardly and rearwardly by means of hydraulic tilting cylinders **16**. A vertically disposed hydraulic ram **18** is mounted centrally between the uprights **14, 15**, and is fixed at its upper end to a cross member **20** attached to the inner telescoping uprights **15**. The cross member **20** carries sheaves **22** over which extend a pair of lift chains **24**. One end of each lift chain **24** is attached to a vertically movable carriage **26** and the other end of each chain is anchored to the lift truck frame so that extension of the inner uprights **15** by the ram **18** lifts the carriage **26**. A pair of fork load arms **28** are mounted on and extend forwardly from the carriage **26** for handling loads in the usual manner.

Shown in solid lines in FIG. 1 is a boom attachment constructed in accordance with the invention and comprising a forwardly and upwardly extending boom structure **30** including a pair of oppositely disposed channel members **32** fastened together at their outer ends **34**. The channel members are fixedly attached in spaced apart relationship at their inner ends to a transversely extending cylindrical base member or trunnion **36**.

When the boom structure is attached to the lift truck as shown, the trunnion **36** is freely and rotatably supported in the angle of the fork arms **28** at their intersection with the carriage **26**. Mounted on the opposite ends of the trunnion are a pair of circular spacer plates **38** of larger diameter than the body of the trunnion, which serve to mount the boom structure centrally with respect to the fork arms **28** and to prevent lateral displacement of the boom structure. The generally triangular boom structure is reinforced by diagonal braces **39** and cross braces **40** extending between the channel members **32**. A loading hook **42** is pivotally suspended from a shaft at the outer end of the boom structure, and a pair of tongs **44** is hung from such hook by a load cable **46**. Of course slings or other loading devices, as desired, may be attached to the hook **42** in lieu of the tongs **44**.

An upright post structure **48** of enclosed box construction is rotatably mounted at its lower end on the trunnion **36** centrally between the ends of such trunnion. For this purpose the lower end of the post structure **48** includes a strap **50** which encompasses the trunnion **36**. The post structure is attached in an upright position to the carriage **26** by axially and laterally adjustable hook mounting means. With reference more particularly to FIGS. 2 and 3, such means include an adjustable sleeve member **52** slidably mounted on the post **48** and securable in any desired position on such post by a set screw **53**. The sleeve member **52** has a pair of arms **54** extending laterally in opposite directions from opposite sides thereof. On each arm **54** a hook member **56** is slidably mounted. Each hook member **56** may be fixed on the arm **54** at any desired distance from the post **48** by a set screw **57**. The hook portion of each member **56** opens downwardly for engaging the top edge of a cross frame member **58** of the lift truck carriage **26**. Thus, by adjusting the sleeve to any desired height above the trunnion **36** according to the height of the carriage **26** and by adjusting the hook members **56** laterally so as not to interfere with the lift chains **24**, the boom attachment may be mounted on any lift truck having a cross frame member **58** as most lift trucks do have.

With the post member **48** in position on the lift truck as described, the boom structure **30**, including the trun-

nion 36, is rotatable relative to the lift truck and post structure 48 from a predetermined angular position as shown in full lines in FIG. 2 to an inoperative, upright position shown in dotted lines in juxtaposition with the post 48. The latter boom position permits the use of the fork arms 28 with the boom remaining attached to the lift truck. A longitudinally extending pin 60 is welded or otherwise secured on the trunnion 36 beneath the strap 50 to limit the rotational movement of the boom structure from a substantially vertical position to a load lifting position of approximately 45 degrees as shown by becoming wedged beneath the straps 50 when the boom is at 45 degrees. Of course, the desired limit of rotation of such boom is a matter of choice with the user, but in general a swing angle of 45 degrees will be sufficient for most purposes.

Adjustable means are provided for maintaining the boom structure 30 in a predetermined angular operative position relative to the post structure 48. The illustrated means include a length of chain 62 secured at one end to an ear member 64 at the outer end of the boom structure 30 and adjustably attached at the required distance from such end to the top of the post structure 48. As shown in the broken-away portion of FIG. 2 and in FIG. 3, the top end wall 66 of the post 48 is provided with a keyhole aperture 68 through which a length of the chain 62 extends into the interior of the post. The chain may be secured at any desired position along its length to the post by inserting a link thereof in the narrow portion of the keyhole aperture.

Means are also provided on the post 48 for selectively latching the boom structure 30 in an inoperative, upright position in nesting relationship with the post 48, such means including a latch 70 pivotally mounted on the post, which cooperatively engages a cross brace 40 of the boom structure as shown in FIG. 2 when the boom is upright. Two hook ends 71 of the latch member 70 are provided with camming surfaces so that the boom structure may be swung to its inoperative position and latched in such position without the operator ever leaving his controls on the lift truck. A stop member 72 on the post beneath the latch member 70 prevents the latch member from swinging below a substantially horizontal position, and a tie strap 73 between the hook ends 71 limits the upward swing of the latch. To swing and latch the boom, the mast 14 is simply tilted rearwardly to cause the boom structure 30 to swing against the post structure and latch itself by the force of its own weight.

FIGS. 4 through 6 illustrate the use of the previously described boom attachment for lifting a load. In FIG. 4 the tilting cylinders 16 are extended to tilt the mast 12 forwardly and thus lower the tongs 44 for engagement with a load 74 on the ground surface. As shown in FIG. 5, the mast 12 is then tilted rearwardly preparatory to raising the carriage 26. With the mast tilted rearwardly, the ram 18 is extended to raise the carriage and thus the boom 30 upwardly, whereupon the load 74 may be stacked high atop an existing storage pile 76 as shown in FIG. 6.

When detached from the lift truck, the boom attachment may be stored on a storage stand 80, shown in FIGS. 7 and 8. Such stand includes a vertical post 81 supported on tripod legs 82. A vertically adjustable rack member 84 is slidably mounted on the post 81 and has a pair of parallel and slightly inclined arms 86, which extend outwardly from the post over one of the tripod legs 82 as shown in FIG. 8.

In storage, the boom attachment hangs by one of its cross braces 40 on the arms 86 of the stand, with the trunnion 36 out of engagement with the ground. In removing the boom attachment from the storage stand 80 and mounting it on a lift truck, the lift truck 10 is driven toward the stand with its fork arms 28 in their lowermost position A (FIG. 7) so that the fork arms will clear the trunnion 36 and so that the hook member 56 on the post structure 48 will clear the upper cross member 58

of the lift truck carriage 26. Then the fork arms are raised to the full line position B in which the trunnion engages the fork arms 28 and the hook member 56 engages the carriage cross member 58, in which position the boom structure is securely attached to the lift truck. To remove the boom structure from the stand, the fork arms 28 are raised still further to the dotted line position C in which position the cross brace 40 clears the rack arms 86, thereby enabling the lift truck 10 to be backed away from the storage stand with the boom attachment fully secured thereto. By disengaging the latch 70, the boom is ready for use. When it is desired to remove the boom structure from the lift truck, the above procedure is followed, but in reverse order.

Having illustrated and described a preferred embodiment of the invention, it should be apparent to those skilled in the art that the invention permits of modification in arrangement and detail. I claim as my invention all such modifications as come within the true spirit and scope of the appended claims.

I claim:

1. In a boom attachment for use with a lift truck including:
- (a) a forwardly and rearwardly tilting mast structure,
- (b) a vertically movable carriage in association with said mast structure,
- (c) fork arms projecting forwardly from said carriage,
- (d) said attachment comprising:
- (e) a boom structure, including a transversely extending trunnion member at the base of said boom structure adapted to be rotatably supported transversely on said fork arms and positioned at the intersection between the inner ends of said fork arms and an upright portion of said carriage,
- (f) said trunnion member including means for centering said boom structure with respect to said fork arms,
- (g) a post structure centrally mounted on said trunnion member for rotation relative to said boom structure,
- (h) downwardly opening hook means on said post structure for securing said post structure in an upright position on said carriage and for at least partially supporting said attachment on said carriage,
- (i) said boom structure being rotatable from a first, inoperative position in juxtaposition with said post structure to a second, load lifting position at a predetermined angle with respect to said post structure,
- (j) means connecting said boom and post structure for maintaining said boom structure in said load lifting position,
- (k) and cooperative means on said post structure and said boom structure for selectively maintaining said boom structure in said inoperative position.

2. In a boom attachment for use with a lift truck including:
- (a) a forwardly and rearwardly tilting mast structure,
- (b) a vertically movable carriage in association with said mast structure,
- (c) fork arms projecting forwardly from said carriage,
- (d) said attachment comprising:
- (e) a boom structure, including a transversely extending trunnion member at the base of said boom structure adapted to be rotatably supported transversely on said fork arms and positioned at the intersection between the inner ends of said fork arms and an upright portion of said carriage,
- (f) said trunnion member including means for centering said boom structure with respect to said fork arms,
- (g) a post structure centrally mounted on said trunnion member for rotation relative to said boom structure,
- (h) adjustable means on said post structure for securing said post structure in an upright position on said carriage,

(i) said boom structure being rotatable from a first, inoperative position in juxtaposition with said post structure to a second, load lifting position at a predetermined angle with respect to said post structure,

(j) means connecting said boom and post structure for maintaining said boom structure in said load lifting position,

(k) and cooperative means on said post structure and said boom structure for selectviely maintaining said boom structure in said inoperative position.

3. A boom attachment according to claim **2**, wherein said carriage includes a cross frame member, and said adjustable means for securing said post structure in an upright position on said carriage includes a sleeve member slidable adjustable axially on said post structure, and laterally adjustable and downwardly opening hook members on said sleeve member for engaging the upper edge of said cross frame member.

4. A boom attachment for use with a lift truck including:

(a) a forwardly and rearwardly tilting mast structure,

(b) a vertically movable carriage, including a cross frame member, in association with said mast structure,

(c) and load carrying fork arms projecting forwardly from said carriage,

(d) said boom attachment comprising:

(e) a trunnion member freely supported transversely on said fork arms and positioned at the intersection of the inner ends of said fork arms and an upright portion of said carriage,

(f) said trunnion member including enlarged end portions for centering said trunnion member on said fork arms,

(g) a boom structure fixedly attached to said trunnion member,

(h) a post structure perpendicular to said trunnion member and rotatably mounted at one end centrally on said trunnion member,

(i) axially and laterally adjustable hook means on said post structure for engaging the upper edge of said cross frame member and mounting said post structure in an upright position on said carriage,

(j) said boom structure being rotatable on said trunnion from a first, upright position in juxtaposition with said post structure to a second, predetermined angular position relative to said post structure,

(k) adjustable means in association with said boom structure and said post structure for maintaining said boom structure in said angular position for lifting a load,

(l) and cooperative latch means on said post structure and said boom structure for selectively maintaining said boom structure in said upright position.

5. A boom attachment for a lift truck including a forwardly and rearwardly tilting mast structure, a vertically movable carriage on said mast structure, and fork arms extending forwardly from said carriage,

(a) said boom attachment comprising:

(b) a trunnion member extending transversely between said fork arms and positioned at the intersection between said fork arms and said carriage,

(c) a post structure mounted on said trunnion member and when in an operative position extending substantially vertically upwardly therefrom,

(d) means movable on said post structure for engaging and disengaging said carriage by relative sliding movement between said means and said carriage such that said attachment can be slidably detached from and attached to said lift truck,

(e) a boom structure fixedly mounted on said trunnion member and when in an operative position extending angularly upwardly and forwardly therefrom,

(f) means mounting said boom structure for rotation relative to said post structure from said operative position to a substantially vertical position adjacent said post structure.

6. A boom attachment for a lift truck including a vertically movable carriage structure and fork arms extending forwardly from said carriage structure,

(a) said boom attachment comprising:

(b) a boom structure supportable at its lower end in the corner defined by said fork arms and said carriage such that said boom structure can be moved vertically upwardly relative to said fork arms,

(c) an upright support structure joined at its lower end to the lower end of said boom structure,

(d) means mounting said boom structure and said support structure for rotation relative to one another for selective positioning of said boom structure,

(e) said support structure including downwardly opening hook means for securing said support structure and movable on said support structure in a substantially vertical disposition to said carriage such that relative vertical movement between said hook means and the carriage of a lift truck effects detachment of said attachment from said lift truck.

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